Carbapenem-resistant Enterobacteriaceae (ent-ə-rō-bak-tir-ē-ā-sē-ē) (CRE)

What is Carbapenem-resistant *Enterobacteriaceae (CRE)*?
Carbapenem-resistant *Enterobacteriaceae* is a type of gram-negative bacteria that is resistant to carbapenem antibiotics. This is considered a threat to patient safety because carbapenem antibiotics often are the last line of defense against gram-negative infections that are resistant to other antibiotics. Currently, *carbapenem*-resistant *Klebsiella pneumoniae (*CRKP) is the species of *CRE* most commonly encountered in the United States. It has been associated with high rates of morbidity and mortality.

How is *CRE* spread?
To get a *CRE* infection, a person must be exposed to the bacteria. For example, *CRE* must enter the respiratory tract to cause pneumonia, or the blood to cause a bloodstream infection.

In healthcare settings, *CRE* bacteria can be spread through person-to-person contact and from patient-to-patient on the hands of healthcare personnel. The bacteria are not spread through the air.

What types of infections do *CRE* cause?
CRE bacteria can cause infections in healthcare settings, including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis. Symptoms of *CRE* infections can vary based on the type of infection a person gets; for example, a lung infection can result in pneumonia.

Are certain people at risk of getting a *CRE* infection?
Healthy people usually do not get a *CRE* infection. The infections are most often seen in patients with prolonged hospitalization and those who are critically ill. Patients may be exposed to *CRE* when they are on ventilators (breathing machines), or have intravenous (vein) catheters or wounds (caused by injury or surgery). Unfortunately, these medical tools may allow *CRE* to enter the body and cause infection.

What is the treatment for *CRE* infections?
Klebsiella infections that are not drug-resistant can be treated with antibiotics. Infections caused by *CRE* are difficult to treat because fewer antibiotics will treat the infections. A microbiology laboratory must run tests to determine which antibiotics will treat the infection.

Am I at risk in taking care of patients with carbapenem-resistant *Enterobacteriaceae*?
This type of infection generally occurs in more sick patients following long courses of broad spectrum antibiotics. As a healthy individual, you are **not** at risk of "catching" this type of infection. However, without taking proper infection control precautions, you are at risk of spreading carbapenem-resistant *Enterobacteriaceae* to other patients.

How can carbapenem-resistant *Enterobacteriaceae* infections be prevented in the healthcare setting?
To prevent spreading *CRE* infections between patients, healthcare personnel must follow specific infection control precautions (See: Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007 at www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf.

All patients colonized or infected with *CRE* should be placed on contact precautions. These precautions include wearing gowns and gloves when they enter carbapenem-resistant *enterobacteriaceae* patient rooms and strict adherence to hand hygiene. Healthcare facilities also must follow strict cleaning procedures to prevent the spread of *CRE*. No recommendation can be made regarding when to discontinue contact precautions.

To prevent the spread of infections, patients should also clean their hands very often, including:

- before preparing or eating food
- before touching eyes, nose, or mouth
- before and after changing wound dressings or bandages
- after using the restroom
- after blowing nose, coughing, or sneezing
- after touching hospital surfaces such as bed rails, bedside tables, doorknobs, remote controls, or the phone

Information on infection control practices, hand hygiene, and environmental cleaning in healthcare facilities is available in the following documents:

- Hand Hygiene in Healthcare Settings (http://www.cdc.gov/handhygiene)
- Guideline for Isolation Precautions in Hospitals (http://www.cdc.gov/ncidod/dhqp/gl_isolation.html)
- Guidelines for Environmental Infection Control in Healthcare Facilities (http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm)

For more information regarding carbapenem-resistant *or carbapenemase-producing Enterobacteriaceae*, visit the following resources:

- http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5810a4.html
- http://www.cdc.gov/ncidod/dhqp/ar_kp.html
- http://www.cdc.gov/ncidod/dhqp/ar_kp_about.html
- http://www.cdc.gov/ncidod/dhqp/ar_kp_faq.html
- http://www.cdc.gov/ncidod/dhqp/pdf/ar/mdroGuideline2006.pdf (Management of Multi-drug Resistant Organisms in Healthcare Settings, 2006)